

DETAILED ACTION

Specification

The title of the invention "Positioning System" is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "Synchronization of Base stations".

Claim Objections

Claim 4 is objected to because of the following informalities: Claim 4 recites "a positioning system including a base station operable as a location measurement unit for E-OTD type positioning". E-OTD type is indefinite because it can possibly include other location/observed time difference techniques. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,788,947 (Becker et al.) in view U.S. Patent Number 5,640,678 (Ishikawa et al.) and further in view of U.S. Patent Application Publication Number 2006/0217120 (Annunziato et al.).
2. Regarding claim 1, Becker discloses a method for installing a positioning system, the positioning system comprising two or more base stations (Figure 1, BA1-BA3 and

Art Unit: 4163

BB1-BB3) the method comprising the steps of: collocating the base stations (Figure 1), quantifying any lack of synchronization between the clocks of the base stations (column 2, lines 47-51; i.e. **the second base station using radio frames received during operation to determine a drift in the radio frame clock between the second base station and second switching system**). But Becker fails to specifically teach relocating one or more of the base stations to their fixed, operational positions and measuring the time of flight of a signal from each of the relocated base stations to at least one other base station. In addition, Becker does not teach determining from the time of flight of the relative separation of the base stations and hence the configuration of the installed positioning system, and recording the configuration of the installed positioning system. Ishikawa teaches a macrocell-microcell communication system where a zone configuration, reshuffle and relocation of microcell base stations can easily be done (column 2, lines 14-16), and Annunziato teaches a method for planning cellular communication networks to optimize network topology including location-based measurement of distances, such as, for instance, observed time differences (OTD) measurements (page 4, paragraph 0077). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the base station relocation of Ishikawa as well as the measurement method of Annunziato into the base station synchronization system of Becker in order to accurately choose an optimum location for base stations in a wireless communication system.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Becker, Ishikawa and Annunziato above and further in view of U.S. Patent Application Publication Number 2002/0187749 (Beasley et al.)

4. Regarding claim 2, Becker, Ishikawa and Annunziato disclose the limitations of claim 1, above. What the combination of Becker, Ishikawa and Annunziato fail to teach is a method wherein after the quantifying step, and before the relocating step, the clocks of the base stations are synchronized. Beasley discloses a wireless base station to base station synchronization method wherein neighboring base stations learn whether each other has accomplished slot assignment, if not, record each other as neighbors, and later become synchronized (Page 8, paragraph 0018). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the synchronization steps of Beasley into the overall system of Becker, Ishikawa and Annunziato in order to initialize the configuration of the wireless communication system.

1. Claims 3, 5-7 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,788,947 (Becker et al.) in view U.S. Patent Number 5,862,477 (Wellard et al.)

2. Regarding claim 3, Becker discloses a positioning system comprising: a plurality of base stations (Figure 1, BA1-BA3 and BB1-BB3); means for quantifying any lack of synchronization between the clocks of the base stations (column 2, lines 47-51; **i.e. the second base station using radio frames received during operation to determine a drift in the radio frame clock between the second base station and second**

switching system). Becker fails to specifically teach means for determining the relative separation of the base stations when relocated to their fixed, operational positions, and means for recording a configuration of the system defined by the relative separations of the base stations. Wellard teaches a topology verification process for controlling a personal communication services system wherein base stations (i.e. cordless fixed parts) are placed at various distances from each other (Figure 2, column 5, lines 27-31). In addition, Wellard teaches that when the personal communication system (PCS) is initially activated, the central control unit executes an initialization sequence to establish and record the system configuration (column 5, lines 10-12). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the topology verification method of Wellard into the base station synchronization system of Becker in order to configure the wireless communication system.

3. Regarding claims 5, 6 and 7, Becker and Wellard disclose the limitations of claim 3. Wellard further teaches a positioning system comprising 3 to 7 base stations (Figure 1, #s 10a -10f; column 4, lines 50-52). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a number of base stations into system of Becker and Wellard in order to configure a large enough wireless communication system.

4. Regarding claim 10, Becker and Wellard disclose the limitations of claim 3. Wellard further teaches a positioning system wherein the means for quantifying and means for recording are embodied in the reference base station (column 5, lines 10-12;

i.e. the central control unit (CCU) executes an initialization sequence to establish and record the system configuration – hence, the reference base station acts like a control unit). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include control station into system of Becker and Wellard in order to manage the configuration of the wireless communication system.

5. Regarding claim 11, Becker discloses a method for installing a positioning system, the positioning system comprising two or more base stations (Figure 1, BA1-BA3 and BB1-BB3) the method comprising the steps of: collocating the base stations (Figure 1), quantifying any lack of synchronization between the clocks of the base stations (column 2, lines 47-51; **i.e. the second base station using radio frames received during operation to determine a drift in the radio frame clock between the second base station and second switching system**). But Becker fails to specifically teach relocating one or more of the base stations and determining the relative separation between the base stations. Wellard teaches a topology verification process for controlling a personal communication services system wherein the system maintains information on the "Hardware ID", associated with the physical "Port ID" on the controller, in which the base station has been connected. It is possible to detect "Port ID" and "Hardware ID" mismatches, as a means of inferring that "geographic" movement has occurred (**i.e. relocation of base stations** – see column 2, lines 50-53). In addition Wellard discloses relative separation between base stations (Figure 2, column 5, lines 27-31). Therefore, it would have been obvious to a person of ordinary

skill in the art at the time the invention was made to include the topology verification process of Wellard into the base station synchronization system of Becker in order to determine the best location for each base station in the wireless communication system.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Becker and Wellard and further in view of "Vehicular Technology Conference Proceeding, VTC 2001 Fall. IEEE VTS 54th" titled "Observed time difference (OTD) estimation for mobile positioning in IS-136 in the presence of clock drift" (Wylie-Green et al.)

7. Regarding claim 4, Becker and Wellard disclose the limitations of claim 3. But neither Becker nor Wellard specifically teach that the positioning system includes a base station operable as a location measurement unit for E-OTD type positioning. Wylie-Green teaches a positioning method where a base station transceiver is used to measure an E-OTD (Figure 3, pages 2677-2678, section II). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the base station transceiver of Wylie-Green in the combined base station synchronization system of Becker and Wellard in order to measure the base station clock drift and its effect on the observed time difference estimates.

8. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Becker and Wellard and further in view of U.S. Patent Number 6,246,883 (Lee).

9. Regarding claims 8 and 9, Becker and Wellard disclose the limitations of claim 3. But the combination of Becker and Wellard fail to disclose that the positioning system wherein the base stations are removably dockable to each other or removably dockable

about the reference base station. Lee discloses a mobile base station method wherein a mobile base station physically docks at the control station and plugs into it (Figure 6A, column 7, lines 28-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the dockability of the base stations of Lee in the combined base station synchronization system of Becker and Wellard in order to transfer functional information between units.

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,788,947 (Becker et al.) in view U.S. Patent Number 5,862,477 (Wellard et al.).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent Number 5,802,473 (Rutledge et al.) teaches an automatic determination and tuning of pico-cell topology for low power wireless systems. U.S. Patent Number 6,185,429 (Gehrke et al.) teaches a method and apparatus for performing a time synchronization of a base site. U.S. Patent Number 7,126,937 (Crosbie et al.) teaches a method and system for clock synchronization across wireless networks. U.S. Patent Number 6,108,553 (Silventoinen et al.) teaches a mobile station positioning system.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ISAAK JAMA whose telephone number is (571)270-5887. The examiner can normally be reached on 7:30 - 5:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester G. Kincaid can be reached on (571) 272-2319. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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